

November 2019

## Braddock Dam

(46.543 N, -100.120182 W)

### Emmons County

- Braddock Dam is a small reservoir in south-central North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/braddock2004.pdf>).
- There is one public boat ramp on Braddock Dam on the east side of the lake.
- The Braddock Dam watershed is about 41,000 acres of mostly agriculture. The most common crops grown are soybeans, corn and spring wheat (Table 1).
- Braddock Dam is a Class III fishery, which are “capable of supporting natural reproduction and growth of warm water fishes (e.g., largemouth bass and bluegill) and associated aquatic biota.”
- Braddock Dam is managed for northern pike and walleye, with fingerlings stocked intermittently. Adult channel catfish are also stocked intermittently. Channel catfish, white sucker, walleye, yellow perch, black bullhead and northern pike were captured during the last sample by the ND Game and Fish.
- Braddock Dam was previously assessed in 1992-1993 and 2010.

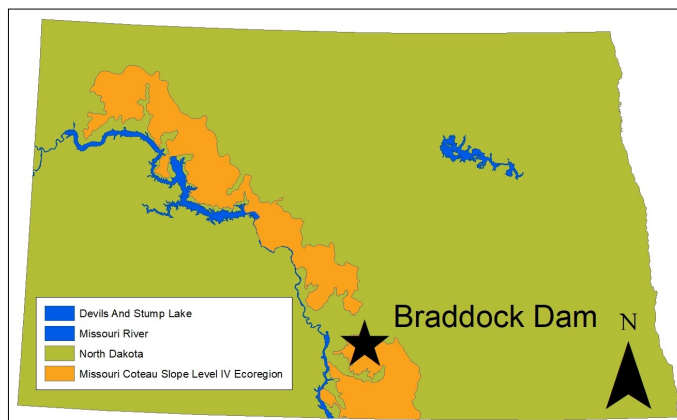


Figure 1. Location of Braddock Dam within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2018). Value listed of crop type represents percentage of total production

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	86.0%	11.9%
Soybeans	40.6%	20.9%
Corn	21.6%	0.2%
Spring Wheat	18.1%	4.6%
Grassland/Pasture	9.3%	82.2%
Developed	3.7%	1.8%
Open Water	0.5%	1.9%
Wetlands	0.4%	1.6%
Forest	0.1%	0.5%
Shrubland	< 0.1%	NA

## Temperature and Dissolved Oxygen

- Braddock Dam can stratify in the summer, with warm, well-oxygenated water at the top of the water column, and cold, low-oxygen water near the bottom.
- There was some thermal stratification recorded in September 2019. Temperature change in the water column was 0.3 degrees Celsius (°C), 0.1°C and 2.3°C in May, July and September, respectively.
- Dissolved oxygen concentrations were lowest in September, coinciding with thermal stratification.

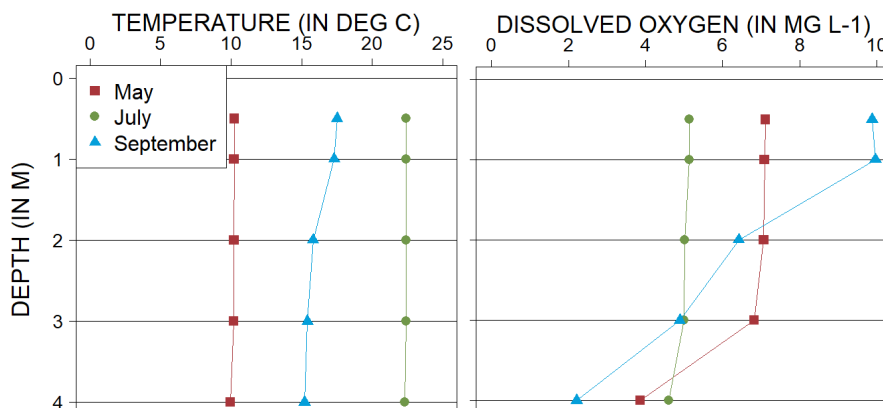


Figure 2. 2019 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ( $mg L^{-1}$ )

## Trophic State Indices

- Trophic state is a measure used by scientists to assess the condition (where lower scores indicate better water quality) of a lake using three common measures: total phosphorus (TP), Secchi disk transparency and chlorophyll-a concentration.
- Braddock Dam is a highly eutrophic reservoir (Figure 3) that has high nutrient concentrations and high algal and plant growth.
- Current trophic state is similar to historical indices.
- There have been confirmed **harmful** algal (cyanobacteria) blooms at Braddock Dam.

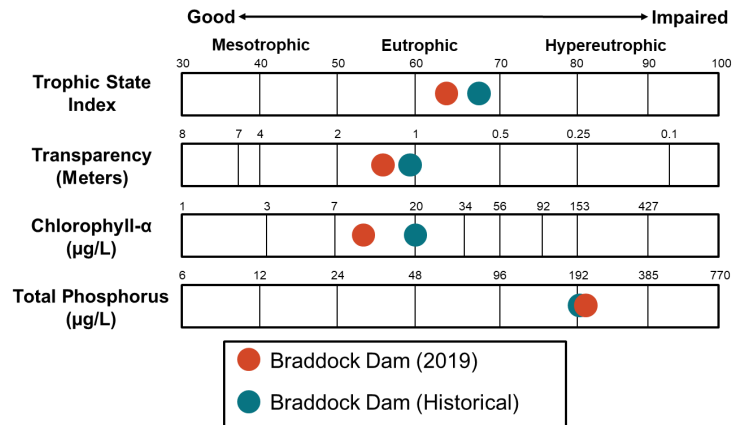


Figure 3. Trophic state indices for 2019 and historical samples

## Nutrients

- Median concentration of total nitrogen (TN) in 2019 was less than the historical median for the lake and less than the median for the Missouri Coteau Slope Level IV Ecoregion (hereafter, Ecoregion) where Braddock Dam is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration in 2019 was greater than the median for the lake and greater than the median for the Ecoregion (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia and nitrate-plus-nitrite were not detected in any samples at Braddock Dam in 2019.

### Nutrient Concentrations (in mg L<sup>-1</sup>) in Braddock Dam

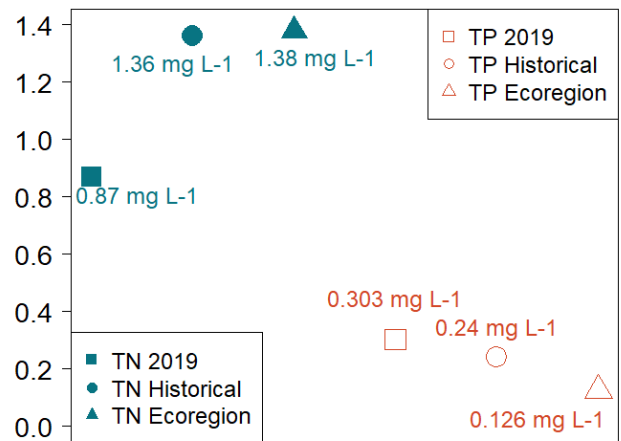


Figure 4. Median concentrations of TN and TP in mg L<sup>-1</sup> compared to regional medians

## Water Chemistry

**Table 2.** Median concentrations of selected constituents for 2019 and historical samples and from all Ecoregion reservoirs.

Measure	2019 Median	Historical Median	Ecoregion Median
Alkalinity	242 mg L <sup>-1</sup>	259 mg L <sup>-1</sup>	207 mg L <sup>-1</sup>
Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )	280 mg L <sup>-1</sup>	266 mg L <sup>-1</sup>	226 mg L <sup>-1</sup>
Calcium (Ca <sup>2+</sup> )	76.7 mg L <sup>-1</sup>	86.2 mg L <sup>-1</sup>	76.7 mg L <sup>-1</sup>
Carbonate (CO <sub>3</sub> <sup>2-</sup> )	8 mg L <sup>-1</sup>	14 mg L <sup>-1</sup>	8 mg L <sup>-1</sup>
Conductivity	1,230 µS cm <sup>-1</sup>	1,420 µS cm <sup>-1</sup>	1,430 µS cm <sup>-1</sup>
Dissolved Solids	825 mg L <sup>-1</sup>	982 mg L <sup>-1</sup>	917.5 mg L <sup>-1</sup>
Magnesium (Mg <sup>2+</sup> )	45.4 mg L <sup>-1</sup>	55.2 mg L <sup>-1</sup>	62.2 mg L <sup>-1</sup>
Sodium (Na <sup>+</sup> )	118 mg L <sup>-1</sup>	161 mg L <sup>-1</sup>	145 mg L <sup>-1</sup>
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	368 mg L <sup>-1</sup>	498 mg L <sup>-1</sup>	487 mg L <sup>-1</sup>

- Sulfate and bicarbonate are the dominant anions in Braddock Dam, while magnesium, calcium and sodium are co-dominant cations (Figure 5).
- Median concentrations of most cations and anions are less than the historical median for the lake and less than the median for the Ecoregion.

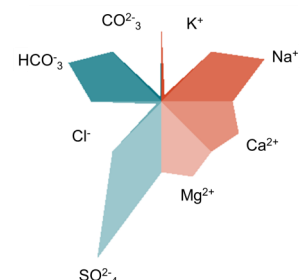


Figure 5. Maucha diagram showing ionic balance based on 2019 data